

## **Chang, Lisa**

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**From:** Grepo-Grove, Gina  
**Sent:** Monday, December 23, 2013 12:13 PM  
**To:** Tiffany Waters  
**Cc:** Chang, Lisa  
**Subject:** RE: Swinomish FY12 (Year 3) QAPP Addendum

Thanks Tiffany. Happy Holidays!

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**From:** Tiffany Waters [mailto:twaters@nwifc.org]  
**Sent:** Monday, December 23, 2013 10:54 AM  
**To:** Grepo-Grove, Gina  
**Cc:** Chang, Lisa  
**Subject:** Swinomish FY12 (Year 3) QAPP Addendum

Hello Ginna,

First, I hope that you are out enjoying the holiday season, so I'm not expecting a reply back this week. However, please see the enclosed for a very overdue QAPP Addendum for Swinomish's third year of sampling that occurred this past summer for their Tribal Journey Water Quality Project (TJWQP) under the NWIFC's cooperative agreement #PA-00J32201-0.

I'll definitely take responsibility for not reminding Sarah at Swinomish of their need to complete a QAPP addendum for their third year of work. As she states below, she did complete the QAPP addendum this last summer, but just delayed in submitting it. For your convenience, I've also enclosed a track changes version that I created using the 'compare' function within word that compares their 2012 Addendum I to this 2013 Addendum II.

I'm not seeing any significant changes to their methodologies [outside of location changes due to the different destination of Quinault], but if there are issues in providing a retroactive approval for this work, please let me know. We are in the process of reviewing their fourth year of this continuing project and, once approval is provided, we will instruct Swinomish to submit a QAPP addendum for Year 4 as soon as possible.

Many thanks,  
Tiffany

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**From:** Sarah Grossman [mailto:[sgrossman@swinomish.nsn.us](mailto:sgrossman@swinomish.nsn.us)]  
**Sent:** Monday, December 16, 2013 11:50 AM  
**To:** Tiffany Waters ([twaters@nwifc.org](mailto:twaters@nwifc.org))  
**Subject:** FY12 QAPP Addendum

Hi Tiffany,

Attached is the QAPP for the 2013 TJWQP (FY12). I apologize that I did not get this to you sooner. I think at the time I was waiting for Larry's portion of the FY12 proposal to be finalized. Let me know if there are any issues with getting it through review.

Also, last week you said that there were some revisions that need to be made on my FY13 proposal. I just wanted to check in on that again before we are off for the holidays.

Thanks again,  
Sarah

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## **QUALITY ASSURANCE PROJECT PLAN: ADDENDUM II**

### **Tribal Journey Water-Quality Project: Canoe Track Monitoring**

Prepared for:

U.S. Environmental Protection Agency

Grant #PA-00J32201-0

Prepared by:

Swinomish Indian Tribal Community

Swinomish Indian Tribal Community  
11430 Moorage Way  
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July 8, 2013

## SECTION A – PROJECT MANAGEMENT

### A.1 Title of Plan and Approval

**Quality Assurance Project Plan: Addendum II**  
**Tribal Journey Water-Quality Project: Canoe Track Monitoring**

Grant #PA-00J32201-0

**Prepared by:**  
**Swinomish Indian Tribal Community**

\_\_\_\_\_  
Date: \_\_\_\_\_  
Charles O'Hara, Swinomish Indian Tribal Community, OPCD Director/Project Officer

\_\_\_\_\_  
Date: \_\_\_\_\_  
Sarah K Grossman, Swinomish Indian Tribal Community, Water-Quality Project Coordinator

\_\_\_\_\_  
Date: \_\_\_\_\_  
Eric E. Grossman, U.S. Geological Survey, Scientific Advisor/QA Officer

\_\_\_\_\_  
Date: \_\_\_\_\_  
Ginna Grepo-Grove, EPA Quality Assurance Manager

\_\_\_\_\_  
Date: \_\_\_\_\_  
Lisa Chang, EPA Project Officer

\_\_\_\_\_  
Date: \_\_\_\_\_  
Tiffany Waters, NWIFC Puget Sound Recovery Projects Coordinator

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### A.3 QAPP Addendum II

This Quality Assurance Project Plan (QAPP) Addendum II is intended to be used in conjunction with the EPA-approved Quality Assurance Project Plan for the Tribal Journey Water Quality Project (PA-00J32201-0), submitted by Swinomish Indian Tribal Community, April, 2011. This QAPP addendum was prepared to address changes and updates for FY12 project activities, including new project activity timeline, goals and objectives, and rationale for the project extension and protocols. Methodologies and protocols, unless specifically stated in this addendum, follow with the approved TJWQP QAPP, April, 2011.

### A.4 Project/Task Organization

**Table 1. A.1 Roles & Responsibilities**

Individual(s) Assigned	Responsible for:	Authorized to:
Sarah K. Grossman	Project Coordinator	Responsible for overall project management, preparation of sampling plan, sample collection, data management and analysis, quality control, reporting, and administrative support.
Eric E. Grossman	Scientific Advisor/QA Officer	Provide scientific guidance, methods development and overall quality assurance of the project
Charles O'Hara	Project Officer	Oversee project

### A.5 Problem Definition/Background

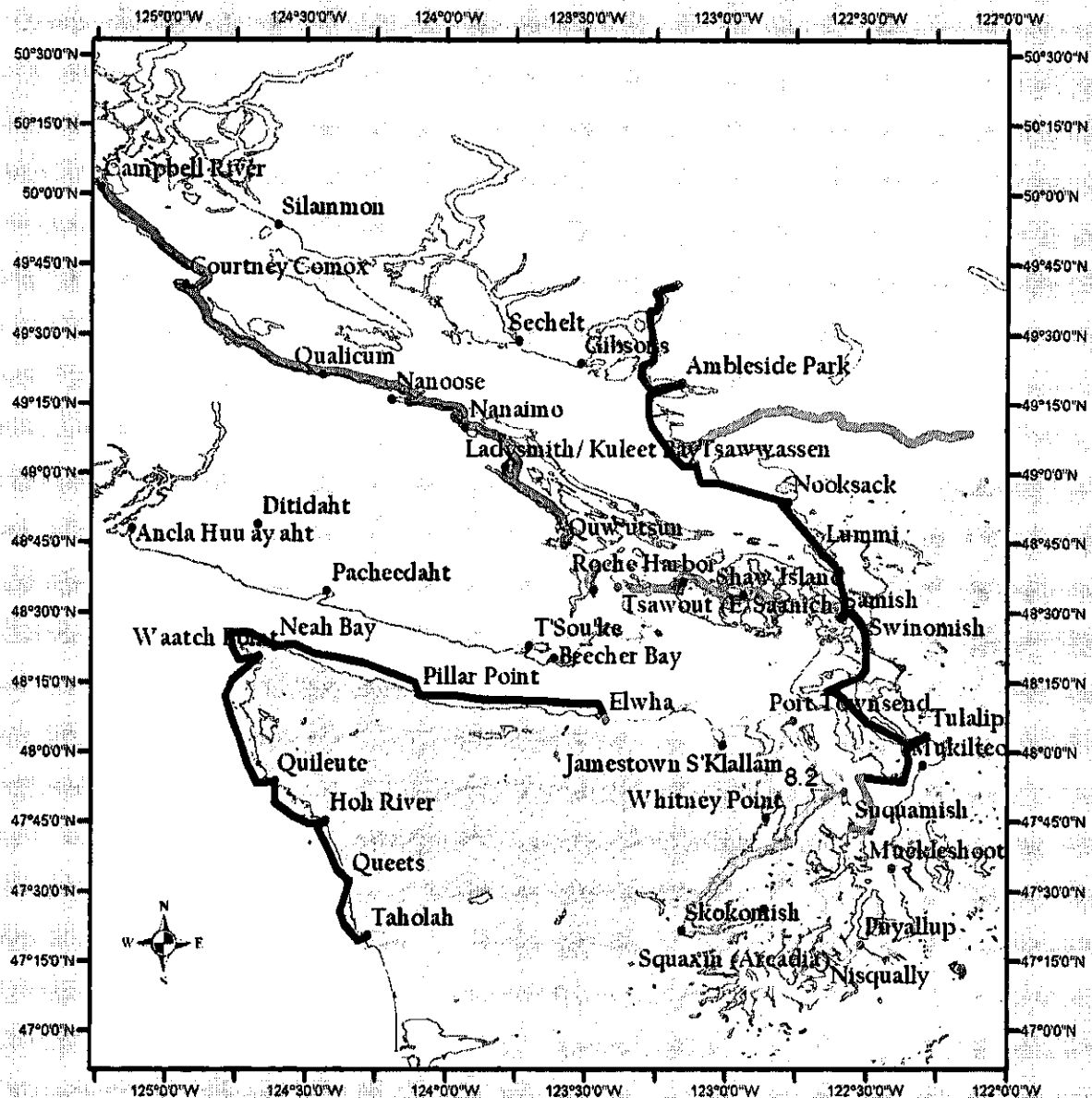
For millennia, indigenous peoples of the Salish Sea, the inland sea spanning Puget Sound (US) and Georgia Strait (Canada), maintained a rich culture around the sustainable harvest of diverse marine resources and intimate interaction with their environment. Today, the cumulative impacts of human activities and climate change are deteriorating coastal ecosystems and accelerating the loss of more than 60 species of ecologically, culturally, and economically important fish, mammals, birds, and harvestable invertebrates which are endangered or threatened (Washington Sea Grant Program, 2000). Efforts are underway to restore degraded ecosystem functions and implement adaptive management strategies to minimize impending climate and urban impacts. However, our capacity to predict future responses and design effective recovery plans for coastal systems is limited by an insufficient quantitative understanding of the processes which maintain nearshore marine habitat distributions and functionality.

The project aims to supplement the monitoring efforts made by other organizations in the region by developing an extensive spatial baseline of water properties, helping to quantify environmental patterns, identify areas of impairment, and through time, detect changes and trends related to land use and climate change. A follow-up study taken on by the project is the deployment of mooring instrument suites in locations around the Salish Sea. These suites will help quantify vertical and temporal variability of water properties in nearshore environments where many culturally significant species reside.

### A.6 Project/Task Description

As described in the QAPP, the Tribal Journey Water-Quality Project monitors *in-situ* surface-water

properties temperature [degrees Celsius (°C)], salinity [practical salinity units (psu)], pH (pH units), dissolved-oxygen concentration [milligrams per liter (mg/L)], dissolved oxygen percent saturation (% sat), and turbidity [Formazin Nephelometric Units (FNU)] using a YSI 6920 sonde along the principal pathways (Figure 1) of the annual Tribal Journey. Existing complimentary data sets will be identified and compiled and quality control procedures on the data sets will take place from January to September 2013.



**Figure 1.** The Salish Sea with primary Tribal Journey routes, West Coast Washington (purple), South Puget Sound (yellow), Hood Canal (green), West Strait of Georgia (black), East Strait of Georgia (red), and Fraser River (blue).

**Table 2. A.6 Task Timeline**

<b>Objective 1: Gather Environmental Data</b>	<b>Sub-Task</b>	<b>JAN</b>	<b>FEB</b>	<b>MAR</b>	<b>APR</b>	<b>MAY</b>	<b>JUN</b>	<b>JUL</b>	<b>AUG</b>	<b>SEP</b>	<b>NOV</b>	<b>DEC</b>
<b>Task 1A Project Planning and Coordination</b>	Administrative Tasks											
	QAPP Addendum Development											
	Monthly Meetings w/ Canoe Families											
<b>Task 1B Data Collection Canoe Tracks</b>	Support Technicians/Collect WQ Data											
<b>Objective 2: Data Analysis and Reporting</b>	<b>Sub-Task</b>											
<b>Task 2A Canoe Track Data Processing and Analysis</b>	Data Entry and Record Keeping											
	Data Analysis											
	Reporting											
	Supporting research and development											
<b>Objective 3: Strategic Planning</b>	<b>Sub-Task</b>											
<b>Task 3A Project Outreach</b>	Develop/Implement Outreach opportunities											
<b>Task 3A Future Project Planning</b>	Facilitate Planning for TJWQP Future											

### Goals and Objectives

During the 2013 Tribal Journey to Quinault, the TJWQP proposes to monitor water-properties (surface-water temperature, salinity, pH, dissolved-oxygen, and turbidity) along Tribal Journey pathways. Data will be compared using Washington State Water Quality criteria, highlighting the variability in water-quality across the Salish Sea. The 2013 Journey data will be compared against previous years Journey results to highlight areas of concern and potential sites for future special studies by the TJWQP. This proposal section is a key element that provides information for the Puget Sound Partnership Action Plan under international outreach, public and cross agency information sharing.

The TJWQP enters its sixth year in 2013 and has built strong collaborative relationships and scientific capacity to capture summer water quality conditions and quantify variability across the vast Salish Sea region. The proposed work will enable the TJWQP coordinator to accomplish collection of data from canoes along principal routes of the Tribal Journey and their analyses relative to findings from 2008-2013. The canoe track data are unique in mapping out spatial patterns at multiple scales, detecting large-scale oceanographic/climate and site-scale land-use influences. This funding will also allow the project to develop outreach materials/presentations for participating Tribal/First Nation communities to learn more about how changes in water-quality are impacting their environment and life ways.



**Project Objectives and Tasks:**

The Objectives of the Tribal Water Quality Project are three-fold:

1. Gather water-quality data across the Salish Sea to quantify variability, detect changes and trends, and identify impaired water bodies (primarily during the summer Tribal Journey).
  - a. ***Project Planning and Coordination***
    - i. ***Facilitative and Administrative Tasks –***
      1. *Secure and manage funding,*
      2. *QAPP addendum development,*
      3. *Attend monthly Canoe Journey meetings to plan monitoring routes and study logistics with Canoe Families (finalized by mid-June),*
      4. *Secure instrumentation and supplies for monitoring, and*
      5. *Recruit, coordinate with, and manage technicians/volunteers*
    - b. ***Data Collection – Canoe Tracks***
      - i. ***Support Technicians/Volunteers/Collect Water Quality Data –***
        1. *Assemble instrument packages and supplies for all routes prior to deployment,*
        2. *Deliver technicians/volunteers and equipment to the start of the routes,*
        3. *Coordinator will serve as technician to operate equipment and collect data along one route*
        4. *Provide needed assistance for technicians on each of the routes to aid in trouble-shooting*
        5. *Ensure that quality control procedures outlined in the QAPP are implemented.*
  2. **Analyze data and synthesize results of TJWQP data results into maps, GIS data layers, and reports for public dissemination.**
    - a. ***Process and Analyze Data: (A) Canoe Tracks and (B) Special Projects –***
      - i. ***The TJWQP Coordinator will be responsible for:***
        1. *Data entry and record keeping,*
        2. *Apply data quality criteria procedures to datasets,*
        3. *Analyze data; includes obtaining the supporting environmental (meteorological observations, upwelling indices, tides and currents, and river discharge) datasets used to aid interpretation of TJWQP results.*
        4. *Facilitate additional analyses with USGS scientists, and*
        5. *Co-author reports, posters, brochures, websites, and presentations disseminated online, and at regional meetings/conferences.*
        6. *Work with USGS to Maintain and serve data/results to Tribes, First Nations, and other interested agencies or academic institutions through the USGS INFOBANK data base [<http://walrus.wr.usgs.gov/infobank/>] and a web-based data query system on our project webpage [[www.usgs.gov/coastsalish](http://www.usgs.gov/coastsalish)].*
  3. **Continue to develop the TJWQP outreach materials and strategic plan.**

**a. Project Outreach**

- i.* Develop web-based Tribal Journey Water-Quality Project outreach materials for effective dissemination of project data, accomplishments, publications, and contributions to Salish Sea science.
  - ii.* Travel to participating Tribal/First Nation communities to report out on project findings and accomplishments.
- b.** Conduct/Attend meetings to gather project input from:
- i.* Tribal/First Nation Leadership (presentation at 2013 Coast Salish Gathering)
  - ii.* Northwest Indian Fisheries Commission – Coordinated Tribal Water Quality Group
  - iii.* Quarterly project review with TJWQP Partners – USGS, Northwest Indian College, Western Washington University, University of Washington, and others. This task will assist the TJWQP with programmatic and technical review of program activities.

**Outcomes:**

Continuation of the water-quality data collection of the Salish Sea and expanding the research to include focused studies of temporal and topical issues of concern to Coast Salish (for example water-quality moorings) are aimed at developing empirical and mechanistic models to predict future habitat conditions and variability relative to biophysical processes (drivers). The project also intends to strengthen the partnerships and collaborations toward shared projects, information sharing, and trans-boundary opportunities, trainings and creating and enhancing communications and tools for sharing results with the public.

1. Conduct data collection, analyses, and provide report of the 2013 Tribal Journey Water Quality Project – Journey to Quinalt
2. Generate a draft progress report of results that examine the variability of the first 6-years of track data and mooring results
3. Update website with 2013 results, presentations, and public outreach opportunities

**Rationale for the Project Extension**

The Coast Salish Nations in partnership with the U.S. Geological Survey (USGS) examine the coastal waters of the Salish Sea providing a new strategy for the study of marine ecosystem dynamics through water-quality baseline studies. Methodologies for the project have been successfully demonstrated since July 2008 (Grossman and Grossman, In Press, 2010, 2011, and 2012; Akin and Grossman, 2010, 2009) and pursuing the monitoring efforts and partnerships into FY12 is essential for maintaining the level of continuity desired by participating canoe families. The canoe track data are unique in mapping out spatial patterns at multiple scales, detecting large-scale oceanographic/climate and site-scale land-use influences. The TJWQ Project has developed capacity to conduct these investigations and with this QAPP desires to proceed with the activities to implement them.

**A.7 Quality Objectives & Criteria**

Data collected under this QAPP addendum are utilized to:

- Qualitatively and quantitatively assess the vertical and temporal variability of the Salish Sea nearshore waters surrounding the Tribal Journey.
- Integrate project data with other regulatory and monitoring agency data sets from around the Salish Sea

Data quality audits are conducted post deployment to assess if the data generated by this task are meeting the data quality objectives (DQO's) necessary to achieve the program goals. Data quality audits are also used to improve this plan. Data not meeting the DQO's are discarded or qualified as appropriate based on best professional judgment. DQO's include specifications for data accuracy and precision, bias, representativeness, completeness, and comparability.

### Accuracy and Audit Precision

Based on available science, available resources, and program objectives, it is required that data collected under this plan conforms to accuracy and precision criteria outlined in Table 3. Data are flagged and discarded from analysis or qualified based on these criteria.

**Table 3. Data quality objectives for water property measurements using a YSI 6920 V2 sonde, Onset TempV4, and HOBO Water Level Logger U20-001-02.**

Units include milligrams per liter (mg/L), percent (%), Formazin Nephelometric Units (FNU)<sup>1</sup>, millisemens per centimeter (mS/cm), parts per thousand (ppt), degrees Celsius (°C), pH standard units, millivolts (mV), and meters (m).

YSI Sensor	Units	Range	Resolution	Method Accuracy	Audit Precision Limit
ROX Optical Dissolved Oxygen	mg/L	0 to 50 mg/L	0.01 mg/L	0 to 20 mg/L: $\pm 0.1$ mg/L or 1% of reading	$\pm 0.5$ mg/L
	% Saturation	0 to 500%	0.10%	0 to 200 %: $\pm 1$ % or 1% of air saturation	N/A
Turbidity 6136	FNU	0 to 1,000 FNU	0.1 FNU	$\pm 2\%$ of reading or 0.3 FNU, whichever is greater	5% of range
Conductivity 6560	mS/cm	0 to 100 mS/cm	0.001 to 0.1 mS/cm	$\pm 0.5\%$ of reading + 0.001 mS/cm	$\pm 0.3$ mS/cm
Salinity	ppt	0 to 70 ppt	0.01 ppt	$\pm 1\%$ of reading or 0.1 ppt, whichever is greater	N/A
Temperature 6560	°C	-5 to +50°C	0.01°C	$\pm 0.15^\circ\text{C}$	N/A
pH 6561	pH units	0 to 14 units	0.01 units	$\pm 0.2$ units	$\pm 0.2$ units
Depth - Shallow	m	0 to 9.1 m	0.001m	$\pm 0.02$ m	N/A

1. The United States Geological Survey methods for reporting turbidity data collected with near-infrared turbidimeters following ISO 7027 protocols is reported as Formazin Nephelometric Units (FNU). More information can be found in the USGS National Field Manual (<http://water.usgs.gov/owq/FieldManual/Chapter6/6>)

### Data Precision and Representativeness

Precision is the degree of agreement among repeated measurements of the same characteristics, or parameter, and gives information about the consistency of methods. The TJWQP monitors water properties through time and space simultaneously allowing for a wide range of variability in the results from measurement to measurement. Audit results must be within the audit precision limits outlined in table 1.

Representativeness is the extent to which measurements actually represent the true environmental condition. To address representativeness the measurements are integrated with positions recorded from a GPS. Data collected represents a snap shot of the surface water quality of the particular location and under the particular tidal and weather regime at the time of sampling. Due to the continuous sampling design, no one sample, is supposed to represent the condition of the region. Rather, the series of data points represent the nature of the variability possible at one location and are analyzed factoring location, tidal state and other weather conditions.

### **Comparability**

Comparability is the degree to which data can be compared directly to similar studies. Using standardized sampling and analytical methods and units of reporting with comparable sensitivity helps ensure comparability. It is important to the TJWQP managers that the data collected meet the highest quality possible and will not only be comparable between project years and mooring locations but meet quality assurance (QA) objectives of other regional agencies for their use.

### **A.8 Special Training/Certification**

Special training of supporting staff, if needed, will be provided by either Swinomish Planning Department staff or U.S. Geological Survey Water Resource Specialists.

### **A.9 Documents and Records**

The project manager will ensure that all project staff and contributors have a current copy of the Quality Assurance Project Plan (QAPP) and access to digital copies of reports, fact sheets, and posters.

Information on data gathered in the field will be recorded on TJWQP Field Forms. Field sheets contain information on general meteorological observations on the day instruments are serviced, the audit/calibration of instruments, calibration solution lot numbers and expiration dates, data file name, time span, number of readings, and an area for "other" comments and observations. Any problems or abnormalities with sampling procedures, instruments or site conditions will be entered on the field form in the comments section.

All field sheet information is entered into the TJWQP monitoring data spreadsheet. The original and a digital copy of the field forms will be kept indefinitely by the Swinomish Office of Planning and Community Development. Raw data files are downloaded from instruments and kept in digital form with a Swinomish and a USGS project representative.

TJWQP and USGS will share all results from samples collected during the project after the QA/Quality Control (QC) tasks have been performed. Data will be released to the public domain through personal request, publications, and internet.

## **SECTION B – DATA GENERATION & ACQUISITION**

### **B.1 Sampling Process Design (Experimental Design)**

Water property measurements temperature, salinity, pH, dissolved-oxygen, and turbidity are collected using YSI 6920 multi-parameter sondes at 0.5 meter depth while towed behind traditional canoes. Over the course of the annual Tribal Journey the multi-probes are towed behind traditional Coast Salish canoes recording water properties to a high-memory display at 10-second intervals from landing to landing site with data points registered spatially using GPS. The 10-second sampling interval on canoes generally produces a dense data spacing of one measurement every ~20 meters. Time required to travel between landings can be anywhere from three to ten hours potentially generating thousands of data points per day. The timing of the Journey is generally a two to three week period starting sometime between mid-June and mid-July. Canoe families from the furthest extents across the Salish Sea are solicited to participate in the project. Depending on the location of the final landing the general routes start in South Puget Sound with Squaxin Island Tribe, Hood Canal near Lynch Cove with the Skokomish Tribe, Northeast Vancouver Island near Campbell River with

the Homalco Nation, and east Strait of Georgia near Vancouver, B.C. with Squamish Nation (figure 1).

### **B.2 Sampling Methods**

Methods and procedures used to monitor water-properties during the Tribal Journey have been established through the 2008, 2009, and 2010 Tribal Journeys and are described in the QAPP. Before instrument deployment each morning, the YSI 6920 sondes were audited and calibrated to ensure accuracy of the data collected, and to correct any instrument drift. Technicians also checked and replace batteries, and clocks are synchronized in the morning before the canoes pull out for the day. As the canoe travels across the water, the sonde is towed behind within the top half meter of the water column recording data at a 10-second interval. Before landing for the evening, the sonde is pulled into the canoe and logging is stopped. Observational data are recorded by technicians in field log books while on the canoe and the information is transferred to the field sheet when canoes return to shore.

### **B.3 Sampling Handling & Custody**

There are currently no samples collected that would require a chain of custody.

### **B.4 Analytical Methods**

Water-property testing is performed using YSI 6920 V2 sondes. The sondes are operated using manufacturer specifications and it is the responsibility of the Project Manager to ensure all field staff are trained in these procedures. Additional guidance for data collection provided by USGS in Gibs, et. al, 2007 is used to ensure DQO's are met.

### **B.5 Quality Control**

Quality control activities are the responsibility of the Project Coordinator at Swinomish and the Scientific Advisor for the project at USGS. Data quality is primarily addressed by consistent performance of valid field instrument operating procedures. TJWQP technicians are thoroughly trained in field methods and proper calibration, general maintenance, and use of field instruments and accurate recording of information before data collection begins. The processed data are screened for errant values due to fouling or physical disruptions which are flagged if found. Flagged values are maintained in the data base, but removed or corrected if independent ground-truth data or corrections are available before analyses.

### **B.6 Instrument/Equipment Testing, Inspection, and Maintenance**

Instrument testing, inspection, and maintenance are the responsibility of the Project Manager and occur prior to instrument deployment. If the calibrations and audits fall within allowable limits (table 3) no further maintenance will be performed.

### **B.7 Instrument/Equipment Calibration and Frequency**

All calibration of field equipment will be based on the manufacturers' recommendations and USGS protocols as described in the USGS National Field Manual for the Collection of Water-Quality Data (Gibs, et. al, 2007). Calibrations for pH, conductance (salinity), and turbidity are performed using National Institute of Standards and Technology (NIST) traceable calibration standards. Temperature and dissolved oxygen calibrations and audits are performed using distilled de-ionized water produced by the Swinomish laboratory using a Barnstead E-pure water filtration system. Audit and calibration logs are completed for each data file.

### **B.8 Inspection/Acceptance of Supplies & Consumables**

NIST traceable standard solutions for pH, conductivity, and turbidity are used for calibration and audits. Standard solution documentation is reviewed by the Project Coordinator prior to use. Lot number and expiration date of the standard solutions are documented on field sheets during audits. Project staffs are also trained on proper storage and use of standard solutions.

### **B.9 Data Acquisition Requirements for Non-Direct Measurements**

The following are types of verified data and sources queried by the TJWQP for analysis of regional environmental variability: The TJWQP will not accept data that fails to meet the collecting agency's quality assurance standards.

**Tides and Currents** – The National Oceanic and Atmospheric Administration and Environment Canada maintain buoys around the Puget Sound basin and Georgia Strait respectively measuring tides, currents, and other water-property and meteorological data at select locations. These data sets from across the Salish Sea are used to make general comparisons between the TJWQP results and tidal data (stage and currents) to interpret forcing on measured water properties.

**Meteorological** – Daily statistics are obtained from the National Oceanic and Atmospheric Administration's National Weather Service and Environment Canada's Canada Weather program data sets are used to compare the regional variability of the TJWQP dataset with the regional weather patterns and their variability.

**River Discharge** – Surface-water data for Washington and British Columbia rivers discharging into the Salish Sea are queried to determine amount (and where data exist, temperature) of fresh-water discharged into the study area surrounding the time of data collection and their influence on measured water properties.

### **B.10 Data Management**

Data is uploaded from the YSI 6920 internal memory to a computer during servicing and file statistics are recorded on the field sheet. The project manager compiles and reviews all data sheets for completeness and general problems before entering data into the master spreadsheet. Raw data are archived and a working copy is used to filter outliers. Data that do not meet data quality objectives are flagged and not used in analyses.

## References Cited

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